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WE CLAIM:

1. In a router connectable to a plurality of neighbour nodes, the router having a plurality of memory units accessible via separate access paths, a method of processing sets of routing information received from corresponding ones of the neighbour nodes, comprising:
- 5 creating a plurality of non-identical routing information subsets from each received set of routing information;
- 10 accessing the memory units via the separate access paths; and
- storing the routing information subsets created from a common set of routing information in respective ones of
- 15 the plurality of memory units.
2. A method as claimed in claim 1, wherein each received set of routing information includes a set of routes and wherein creating a plurality of non-identical
- 20 routing information subsets from each received set of routing information includes creating a plurality of non-identical subsets of routes from the set of routes in the received set of routing information.
- 25 3. A method as claimed in claim 2, each route having a specificity, wherein the plurality of non-identical subsets of routes is created from the set of routes in the received set of routing information on the basis of the specificity of each route in the set of routes in the
- 30 received set of routing information.

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4. A method as claimed in claim 2, wherein storing the routing information subsets created from a common set of routing information in respective ones of the plurality of memory units includes storing each subset of routes
5 created from a common set of routes in a respective one of the memory units associated with that subset.

5. A method as claimed in claim 1, wherein each routing information subset from among the routing information
10 subsets created from a common set of routing information has a portion that is not present in any of the other routing information subsets created from said common set of routing information.

15 6. A method as claimed in claim 5, wherein each received set of routing information includes a set of routes and wherein creating a plurality of non-identical routing information subsets from each received set of routing information includes creating a plurality of non-
20 identical subsets of routes from the set of routes in the received set of routing information.

7. A method as claimed in claim 6, wherein storing the routing information subsets created from a common set of
25 routing information in respective ones of the plurality of memory units includes storing each subset of routes created from a common set of routes in a respective one of the memory units associated with that subset.

30 8. A method as claimed in claim 7, further comprising:

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for each memory unit, creating a forwarding sub-table associated with that memory unit from all subsets of routes stored in that memory unit,.

5 9. A method as claimed in claim 8, further comprising:
storing each forwarding sub-table in the memory unit associated with that forwarding sub-table.

10 10. A method as claimed in claim 8, further comprising:
creating a complete forwarding table from all the forwarding sub-tables.

15 11. A method as claimed in claim 9, further comprising:
for each memory unit and for each neighbour node,
creating a partial output routing information base associated with that memory unit and that neighbour node from all subsets of routes stored in that memory unit.

20 12. A method as claimed in claim 11, further comprising:
for each neighbour node, creating a complete output routing information base associated with that neighbour node from all partial output routing information bases associated with that neighbour node.

25 13. A method as claimed in claim 12, further comprising:
advertising to each of the at least one neighbour node the complete output routing information base associated with that neighbour node.

30 14. A method as claimed in claim 1, wherein each received set of routing information includes a set of prefixes and associated attributes and wherein creating a

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plurality of non-identical routing information subsets from each received set of routing information includes creating a plurality of non-identical subsets of prefixes and associated attributes from the set of prefixes and
5 associated attributes in the received set of routing information.

15. A method as claimed in claim 1, wherein each received set of routing information includes a set of
10 learned locations and wherein creating a plurality of non-identical routing information subsets from each received set of routing information includes creating a plurality of non-identical subsets of learned locations from the set of learned locations in the received set of
15 routing information.

16. A method as claimed in claim 1, further comprising:
identifying a set of at least two available memory units among the plurality of memory units;
20 wherein creating a plurality of non-identical routing information subsets from each received set of routing information includes creating as many non-identical routing information subsets as there are memory units in the set of available memory units.

25
17. A method as claimed in claim 16, wherein storing the routing information subsets created from a common set of routing information in respective ones of the plurality of memory units includes storing the routing information
30 subsets created from the common set of routing information in respective ones of the at least two memory units in the set of available memory units.

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18. A method as claimed in claim 16, further comprising:
identifying a new set of at least two available
memory units among the plurality of memory units;
- 5 creating as many non-identical routing information
subsets from each received set of routing information as
there are memory units in the new set of available memory
units.
- 10 19. A method as claimed in claim 18, further comprising:
storing the routing information subsets created from
a common set of routing information in respective ones of
the plurality of available memory units includes storing
the routing information subsets created from the common
15 set of routing information in respective ones of the at
least two memory units in the new set of available memory
units.
- 20 20. A method as claimed in claim 16, further comprising:
identifying a new set of at least two available
memory units among the plurality of memory units;
if the number of available memory units has
increased, creating a greater number of non-identical
routing information subsets; and
- 25 if the number of available memory units has
decreased, creating a lesser number of non-identical
routing information subsets.
- 30 21. A method as claimed in claim 20, each routing
information subset being associated with a size prior to
identification of the new set of at least two available
memory units, the method further comprising:

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if the number of available memory units has increased, creating a greater number of non-identical routing information subsets by splitting one or more of the routing information subsets having the largest former
5 size.

22. A method as claimed in claim 20, each routing information subset being associated with a size prior to identification of the new set of at least two available
10 memory units, the method further comprising:

if the number of available memory units has decreased, creating a lesser number of non-identical routing information subsets by combining two or more of the routing information subsets having the smallest
15 former size.

23. A method as claimed in claim 21, further comprising:

if the number of available memory units has decreased, creating a lesser number of non-identical routing information subsets by combining the routing information subsets having the smallest former size.
20

24. A computer-readable storage medium comprising software instructions for execution in a computer of a
25 method in accordance with claim 1.

25. A computer readable storage medium containing a program element for execution by a computing device to implement a received routing information processing
30 entity in a router, the router having a plurality of memory units accessible via separate access paths, the program element including:

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program code means for creating a plurality of non-identical routing information subsets from each received set of routing information;

5 program code means for accessing the memory units via the separate access paths; and

program code means for causing the routing information subsets created from a common set of routing information to be stored in respective ones of the plurality of memory units.

10

26. A router for use in a communications network, comprising:

a switch fabric having a plurality of communication ports;

15

a plurality of interfaces, each interface being connected to a corresponding communication port of the switch fabric and connectable to a corresponding neighbour node in the network, each interface being capable of receiving routing information from the

20

corresponding neighbour node;

a plurality of memory units, each accessible via a separate access path; and

a control entity connected to the interfaces and to the plurality of memory units, the control entity being
25 operable to create a plurality of non-identical routing information subsets from each received set of routing information and to cause the routing information subsets created from a common set of routing information to be stored in respective ones of the plurality of memory
30 units.

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27. A router as claimed in claim 26, wherein each interface is capable of receiving traffic packets from the corresponding neighbour node, each traffic packet having a destination address, each interface being
5 adapted to modify a received traffic packet on the basis of the destination address of the traffic packet and on the basis of forwarding information, each interface being further adapted to send modified traffic packets to the corresponding communication port of the switch fabric.

10

28. A router as claimed in claim 27, wherein the control entity is adapted to generate the forwarding information from the routing information subsets stored in the plurality of memory units.

15

29. A router as claimed in claim 28, further comprising a common local memory unit for storing the forwarding information, wherein each interface has access to the common local memory unit.

20

30. A router as claimed in claim 28, further comprising a plurality of separately accessible local memory units for storing the forwarding information, wherein each interface has access to a corresponding one of the local
25 memory units.

25

31. A router as claimed in claim 30, wherein each of the plurality of memory units is a respective one of the local memory units.

30

32. A router as claimed in claim 26, wherein each interface is capable of receiving traffic packets from

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the corresponding neighbour node, each traffic packet having a destination address, each interface being adapted to modify each received traffic packet by appending to it information relating to a destination communication port that depends on the destination address of the traffic packet and on forwarding information, each interface being further adapted to send modified traffic packets to the corresponding communication port of the switch fabric;

10 wherein the switch fabric is operable to output each received modified traffic packet via the communication port of the switch fabric which is the destination communication port associated with that modified traffic packet.

15

33. A router as claimed in claim 32, each interface being adapted to:

receive modified traffic packets from the corresponding communication port of the switch fabric;

20 restore each modified traffic packet by removing from it information relating to the destination communication port, so as to leave the original destination address of the traffic packet; and

send restored traffic packets to the corresponding
25 neighbour node.

34. A router as claimed in claim 26, wherein the control entity is connected directly to each of the plurality of memory units, thereby to establish said separate access
30 paths of the memory units.

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35. A router as claimed in claim 34, wherein the control entity is connected directly to each of the plurality of interfaces.

5 36. A router as claimed in claim 34, wherein the communication port connected to each interface establishes a respective first control link between that interface and the switch fabric, wherein the switch fabric further includes at least one further
10 communication port connected to the control entity, thereby to establish a second control link, wherein the control entity receives routing information from a given one of the interfaces via the respective first control link and via the second control link.

15 37. A router as claimed in claim 34, wherein the switch fabric includes at least one further communication port connected to the control entity, thereby to establish a control link, wherein the control entity receives routing
20 information from a given one of the interfaces via the communication port of the switch fabric connected to that interface and via the control link.

25 38. A router as claimed in claim 37, wherein the switch fabric includes a plurality of additional communication ports respectively connected to the plurality of memory units, thereby to establish said separate access paths of the memory units, wherein the switch fabric is further adapted to receive the routing information subsets from
30 the control entity via said further communication port.

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39. A router as claimed in claim 38, wherein the control entity is connected directly to each of the plurality of interfaces.

5 40. A router as claimed in claim 38, wherein communication port connected to each interface establishes a respective first control link between that interface and the switch fabric, wherein the switch fabric includes at least one further communication port
10 connected to the control entity, thereby to establish a second control link, wherein the control entity receives routing information from a given one of the interfaces via the respective first control link and via the second control link.

15 41. A router as claimed in claim 38, wherein the switch fabric includes at least one further communication port connected to the control entity, thereby to establish a control link, wherein the control entity receives routing
20 information from a given one of the interfaces via the communication port of the switch fabric connected to that interface and via the control link.

42. A router as claimed in claim 26, further comprising:
25 a plurality of interface cards;
wherein each of the plurality of interfaces is located on a corresponding one of the interface cards;
and

wherein each of the plurality of memory units is
30 located on a corresponding one of the interface cards such that at least two of the interface cards contain different ones of the memory units.

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43. A router as claimed in claim 42, further comprising:
a controller card;

5 wherein the control entity is located on the
controller card.

44. A router as claimed in claim 26, further comprising:
a plurality of controller cards;

10 wherein each of the plurality of memory units is
located on a corresponding one of the controller cards
such that at least two of the controller cards contain
different ones of the memory units.

45. A router as claimed in claim 44, wherein the control
15 entity is located on one of the controller cards.

46. A router as claimed in claim 44, wherein the control
entity is located on more than one of the controller
cards.

20

47. A router as claimed in claim 44, further comprising:
at least one interface card;
wherein each interface is located on a corresponding
one of the at least one interface card.

25

48. A router as claimed in claim 26, wherein each
received set of routing information includes a set of
routes and wherein the control entity being operable to
create a plurality of non-identical routing information
30 subsets from each received set of routing information
includes the control entity being adapted to create a

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plurality of non-identical subsets of routes from the set of routes in the received set of routing information.

5 49. A router as claimed in claim 48, each route having a specificity, wherein the plurality of non-identical subsets of routes is created from the set of routes in the received set of routing information on the basis of the specificity of each route in the set of routes in the received set of routing information.

10

50. A router as claimed in claim 48, wherein the control entity being operable to cause the routing information subsets created from a common set of routing information to be stored in respective ones of the plurality of memory units includes the control entity being adapted to cause each subset of routes created from a common set of routes to be stored in a respective one of the memory units associated with that subset.

15 51. A router as claimed in claim 26, wherein each routing information subset from among the routing information subsets created from a common set of routing information has a portion that is not present in any of the other routing information subsets created from said common set of routing information.

25 52. A router as claimed in claim 51, wherein each received set of routing information includes a set of routes and wherein being operable to create a plurality of non-identical routing information subsets from each received set of routing information includes the control entity being operable to create a plurality of non-

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identical subsets of routes from the set of routes in the received set of routing information.

53. A router as claimed in claim 52, wherein the control
5 entity being operable to cause the routing information
subsets created from a common set of routing information
to be stored in respective ones of the plurality of
memory units includes the control entity being adapted to
cause each subset of routes created from a common set of
10 routes to be stored in a respective one of the memory
units associated with that subset.

54. A router as claimed in claim 53, wherein the control
entity is further adapted to create a forwarding sub-
15 table associated with each memory unit from all subsets
of routes stored in that memory unit.

55. A router as claimed in claim 54, wherein the control
entity is further adapted to cause each forwarding sub-
20 table to be stored in the memory unit associated with
that forwarding sub-table.

56 A router as claimed in claim 55, wherein each
interface is capable of receiving traffic packets from
25 the corresponding neighbour node, each traffic packet
having a destination address, each interface being
adapted to modify a received traffic packet on the basis
of the destination address of the traffic packet and on
the basis of a complete forwarding table, each interface
30 being further adapted to send modified traffic packets to
the corresponding communication port of the switch
fabric;

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wherein the control entity is adapted to create the complete forwarding table from all the forwarding sub-tables.

5 57. A router as claimed in claim 55, wherein the control entity is further adapted to create, for each memory unit and for each neighbour node, a partial output routing information base associated with that memory unit and that neighbour node from all subsets of routes stored in
10 that memory unit.

58. A router as claimed in claim 57, wherein the control entity is further adapted to create, for each neighbour node, a complete output routing information base
15 associated with that neighbour node from all partial output routing information bases associated with that neighbour node.

59. A router as claimed in claim 58, wherein the control
20 entity is further adapted to advertise to each of the at least one neighbour node the complete output routing information base associated with that neighbour node.

60. A router as claimed in claim 26, wherein each
25 received set of routing information includes a set of prefixes and associated attributes and wherein the control entity being adapted to create a plurality of non-identical routing information subsets from each received set of routing information includes the control
30 entity being adapted to create a plurality of non-identical subsets of prefixes and associated attributes

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from the set of prefixes and associated attributes in the received set of routing information.

61. A router as claimed in claim 26, wherein each
5 received set of routing information includes a set of
learned locations and wherein the control entity being
adapted to create a plurality of non-identical routing
information subsets from each received set of routing
information includes the control entity being adapted to
10 create a plurality of non-identical subsets of learned
locations from the set of learned locations in the
received set of routing information.

62. A router as claimed in claim 43, wherein the control
15 entity is further adapted to identify a set of at least
two available memory units among the plurality of memory
units, wherein creating a plurality of non-identical
routing information subsets from each received set of
routing information includes creating as many non-
20 identical routing information subsets as there are memory
units in the set of available memory units.

63. A router as claimed in claim 43, wherein each
interface card is operable to transmit a signal to the
25 control entity indicative of whether that interface card
comprises an available memory unit.

64. A router as claimed in claim 63, wherein causing the
routing information subsets created from a common set of
30 routing information to be stored in respective ones of
the plurality of memory units includes causing the
routing information subsets created from the common set

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of routing information to be stored in respective ones of the at least two memory units in the set of available memory units.

- 5 65. A router as claimed in claim 63, wherein the control entity is further adapted to:

identify a new set of at least two available memory units among the plurality of memory units; and

- 10 create as many non-identical routing information subsets from each received set of routing information as there are memory units in the new set of available memory units.

- 15 66. A router as claimed in claim 65, wherein the control entity is further adapted to cause the routing information subsets created from the common set of routing information to be stored in respective ones of the at least two memory units in the new set of available memory units.

- 20 67. A router as claimed in claim 63, wherein the control entity is further adapted to:

identify a new set of at least two available memory units among the plurality of memory units;

- 25 if the number of available memory units has increased, create a greater number of non-identical routing information subsets; and

- if the number of available memory units has decreased, create a lesser number of non-identical
30 routing information subsets.

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68. A router as claimed in claim 67, each routing information subset being associated with a size prior to identification of the new set of at least two available memory units, wherein the control entity is further adapted to:

if the number of available memory units has increased, create a greater number of non-identical routing information subsets by splitting the routing information subsets having the largest former size.

10

69. A router as claimed in claim 67, each routing information subset being associated with a size prior to identification of the new set of at least two available memory units, wherein the control entity is further adapted to:

if the number of available memory units has decreased, create a lesser number of non-identical routing information subsets by combining the routing information subsets having the smallest former size.

20

70. A router as claimed in claim 68, wherein the control entity is further adapted to:

if the number of available memory units has decreased, create a lesser number of non-identical routing information subsets by combining the routing information subsets having the smallest former size.

25

71. A router as claimed in claim 57, wherein at least two of the partial output routing information bases for a given neighbour node are created in parallel.

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72. A router as claimed in claim 57, wherein all of the partial output routing information bases for a given neighbour node are created in parallel.

- 5 73. A method of distributing routing information among a plurality of memory units, the routing information including a plurality of routes, each route having a corresponding property, the method comprising:

associating at least one of the memory units with
10 each route on the basis of said property of that route, at least one of the plurality of routes being associated with fewer than all of the memory units;

causing each route to be stored in each of the at least one memory unit associated with that prefix.

15

74. A method as claimed in claim 73, wherein each route includes a prefix and wherein associating at least one of the memory units with a route includes:

determining a length of the route's prefix; and
20 associating at least one of the memory units with the route on the basis of the length of the route's prefix.

75. A method as claimed in claim 74,
25 wherein the number of memory units associated with a route is inversely proportional to the length of the route's prefix.

76. A method as claimed in claim 73, wherein each route
30 includes a prefix and wherein associating at least one of the memory units with a route includes:

determining a bit pattern of the route's prefix; and

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associating at least one of the memory units with the route on the basis of the bit pattern of the route's prefix.

- 5 77. A method as claimed in claim 76, each bit pattern having a density of logical ones, wherein the number of memory units associated with a route is a function of the density of the bit pattern of the route's prefix.
- 10 78. A method as claimed in claim 76, each prefix being associated with a respective bit mask, wherein determining the bit pattern of a prefix includes masking the prefix with the bit mask associated with the prefix.
- 15 79. A method as claimed in claim 73, wherein each route includes a prefix and wherein associating at least one of the memory units with a route includes:
- determining a value of the route's prefix; and
- associating at least one of the memory units with
- 20 the route on the basis of the value of the route's prefix.
80. A method as claimed in claim 79,
- wherein the number of memory units associated with
- 25 the route is inversely proportional to the value of the route's prefix.
81. A method as claimed in claim 79, each prefix being associated with a respective bit mask,
- 30 wherein determining the value of a prefix includes masking the prefix with the bit mask associated with the

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prefix and computing a numeric value of any unmasked bits in the prefix.

82. A method as claimed in claim 73, wherein each route
5 includes a prefix and wherein associating at least one of the memory units with a route includes:

determining a bit pattern of the prefix; and

10 associating at least one of the memory units with the route's prefix on the basis of the bit pattern of the prefix so as to permit parallel computation of partial output routing information bases on the basis of the prefixes associated with the routes in each memory unit.

83. A method as claimed in claim 73, wherein associating
15 at least one of the memory units with a route includes:

associating at least two of the memory units with each route on the basis of that route, at least one route not being associated with all of the memory units; and

20 wherein causing each of the at least one route to be stored in the at least one memory unit associated with that route includes causing each of the at least one route to be stored in the at least two memory units associated with that route.

25 84. A method as claimed in claim 83, wherein each route includes a prefix and wherein associating at least two of the memory units with each route includes:

determining a bit pattern of the route's prefix; and

30 associating at least two of the memory units with the route on the basis of the bit pattern of the route's prefix.

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85. A computer readable storage medium comprising software instructions for execution in a computer of a method in accordance with claim 73.

5 86. A computer readable storage medium comprising software instructions for execution in a computer of a method in accordance with claim 82.

87. A method as claimed in claim 73, wherein said
10 property of a route is a specificity of the route.

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